

# The impact of the urban pattern on the solar radiations in Jeddah, Saudi Arabia

*Khan Alhashimi Ahmed<sup>1\*</sup>, Duris Kevin<sup>2</sup>, Sémidor Catherine<sup>3</sup>*

<sup>1,3</sup> GRECAU (Groupe de Recherche Environnement, Conception Architecturale et Urbaine) laboratory, Bordeaux.

<sup>2</sup> Architect – M.Sc. Civil Engineering

**Abstract**– The sustainable development in Saudi Arabia and especially the city of Jeddah, our study case, goes through the analysis of the latest developments and the vernacular architecture. The climate is really hot and humid and the West orientation is the most difficult to prevent the sun energy from penetrating inside the buildings and to irradiate the streets.

Our study case is focused on four zones in Jeddah: two from the old city of Jeddah and two from new districts. These four zones are representatives of the entire city by their typology. They have been simulated with two recognized software: Autodesk Ecotect and Autodesk Vasari. Also, a reference site with no solar mask has been simulated. The results are compared with a satisfaction survey of 537 inhabitants of Jeddah. The purpose of the simulations is to find a direct link and quantify it between the existing urban forms in Jeddah and the solar energy received by the façades and the streets and then find out what are the best solutions to reduce the solar radiations inside the urban fabric to design a more sustainable cities for the future constructions and in hot and humid climates in general. We have deduced from the results compared to the reference, a solar energy reduction coefficient by the urban form that shows that the impact of the urban form on the solar energy is considerable.

This study shows that the solar energy reduction coefficient is directly linked with the indoor environmental quality: thermal and natural lighting. There is a remarkable difference between the old city and the modern city of Jeddah due to the urban configuration and not in favor of the new districts, this study will show why there is such a contrast.